Patent Claims

1. Polymer-modified nanoparticles which are suitable as UV stabilisers in polymers, characterised in that they are obtainable by a process in which, in a step a), an inverse emulsion comprising one or more water-soluble precursors of the nanoparticles or a melt is prepared with the aid of a random copolymer of at least one monomer containing hydrophobic radicals and at least one monomer containing hydrophilic radicals, and, in a step b), particles are produced.

2. Nanoparticles according to Claim 1, characterised in that the particles essentially consist of oxides or hydroxides of silicon, cerium, cobalt, chromium, nickel, zinc, titanium, iron, yttrium and/or zirconium.

3. Nanoparticles according to at least one of the preceding claims, characterised in that the particles have a mean particle size, determined by means of dynamic light scattering or transmission electron microscope, of from 3 to 200 nm, preferably from 20 to 80 nm, and very particularly preferably from 30 to 50 nm, and the particle-size distribution is preferably narrow.

4. Nanoparticles according to at least one of the preceding claims, characterised in that the absorption maximum is in the range 300 – 500 nm, preferably in the range up to 400 nm.

5. Process for the production of polymer-modified nanoparticles, characterised in that, in a step a), an inverse emulsion comprising one or more water-soluble precursors of the nanoparticles or a melt is prepared with the aid of a random copolymer of at least one monomer containing hydrophobic radicals and at least one monomer

containing hydrophilic radicals, and, in a step b), particles are produced.

6. Process according to Claim 5, characterised in that particles are produced in step b) by reaction of the precursors or by cooling of the melt.

7. Process according to Claim 6, characterised in that the precursors are reacted with an acid, a base, a reducing agent or an oxidant.

8. Process according to at least one of the preceding claims, characterised in that the droplet size in the emulsion is in the range from 5 to 500 nm, preferably in the range from 10 to 200 nm.

9. Process according to at least one of the preceding claims, characterised in that a second emulsion in which a reactant for the precursors is in emulsified form is mixed in step b) with the precursor emulsion from step a).

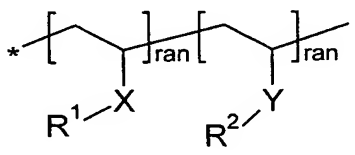
10. Process according to Claim 9, characterised in that the two emulsions are mixed with one another by the action of ultrasound.

11. Process according to at least one of the preceding claims, characterised in that the one or more precursors are selected from water-soluble metal compounds, preferably silicon, cerium, cobalt, chromium, nickel, zinc, titanium, iron, yttrium or zirconium compounds, and the precursors are preferably reacted with an acid or lye.

12. Process according to at least one of the preceding claims, characterised in that a coemulsifier, preferably a nonionic surfactant, is employed.

13. Process according to at least one of the preceding claims, characterised in that the weight ratio of structural units containing hydrophobic radicals to structural units containing hydrophilic radicals in the random copolymers is in the range from 1:2 to 500:1, preferably in the range from 1:1 to 100:1 and particularly preferably in the range from 7:3 to 10:1, and the weight average molecular weight of the random copolymers is in the range from $M_w = 1000$ to 1,000,000 g/mol, preferably in the range from 1500 to 100,000 g/mol and particularly preferably in the range from 2000 to 40,000 g/mol.

14. Process according to at least one of the preceding claims, characterised in that the copolymers conform to the formula I



I

where

X and Y correspond to the radicals of conventional nonionic or ionic monomers, and

R^1 stands for hydrogen or a hydrophobic side group, preferably selected from branched or unbranched alkyl radicals having at least 4 carbon atoms, in which one or more, preferably all, H atoms may have been replaced by fluorine atoms, and

R^2 stands for a hydrophilic side group, which preferably has a phosphonate, sulfonate, polyol or polyether radical,

and where $-X-R^1$ and $-Y-R^2$ may each have a plurality of different meanings within a molecule.

15. Process according to Claim 14, characterised in that X and Y, independently of one another, stand for -O-, -C(=O)-O-, -C(=O)-NH-, $-(CH_2)_n-$, phenylene or pyridyl.

16. Process according to at least one of the preceding claims, characterised in that at least one structural unit contains at least one quaternary nitrogen atom, where R^2 preferably stands for a $-(CH_2)_m-(N^+(CH_3)_2)-(CH_2)_n-SO_3^-$ side group or a $-(CH_2)_m-(N^+(CH_3)_2)-(CH_2)_n-PO_3^{2-}$ side group, where m stands for an integer from the range from 1 to 30, preferably from the range from 1 to 6, particularly preferably 2, and n stands for an integer from the range from 1 to 30, preferably from the range from 1 to 8, particularly preferably 3.

17. Process according to at least one of the preceding claims, characterised in that at least one structural unit is an oligomer or polymer, preferably a macromonomer, where polyethers, polyolefins and polyacrylates are particularly preferred as macromonomers.

18. Use of nanoparticles according to at least one of Claims 1 to 4 for the UV stabilisation of polymers.

19. UV-stabilised polymer composition essentially consisting of at least one polymer, characterised in that the polymer comprises nanoparticles according to at least one of Claims 1 to 4.

20. Polymer according to Claim 19, characterised in that the polymer is polycarbonate (PC), polyethylene terephthalate (PETP), polyimide (PI), polystyrene (PS), polymethyl methacrylate (PMMA) or a copolymer having at least a fraction of one of the said polymers.

21. Process for the preparation of UV-stabilised polymer compositions, characterised in that the polymer material is mixed with nanoparticles according to at least one of Claims 1 to 4, preferably in an extruder or compounder.